Chronic Wasting Disease Survey in Utah, 1998-1999

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Summary

Utah began surveillance of free roaming deer and elk for Chronic Wasting Disease (CWD) in the fall of 1998. The cooperative effort between the Utah Department of Agriculture and Food (UDAF), and the Utah Division of Wildlife Resources (DWR) was instigated by the presence of the disease in the neighboring states of Colorado and Wyoming. The study was nearly complete when it was learned that a 29 year old Utah resident had been diagnosed with Sporadic (or Classical) Creutzfeldt – Jakob Disease (CJD), prompting a continuation of the survey the following year. The extended survey covered a total time period of 15 months.

In 1998, 154 hunter-harvested deer were examined by histopathology and selected samples were submitted to NVSL for immunohistochemistry. All were negative. In 1999, 607 samples were submitted to NVSL for immuno-histochemistry testing and all were negative for protease resistant prion protein. All the deer sampled in Utah were over 2 years of age and the median age of the deer and elk sampled was 2.5 years. Sampling 761 animals from a total estimated population of 400,000 animals provides a 99% assurance of detecting the disease in a population where the incidence of the disease is 1% or greater.

A program of targeted surveillance of deer and elk that exhibit wasting or central nervous system disturbance has been implemented and six samples have all been negative for protease resistant prion-protein. Utah intends to continue surveillance efforts through targeted sampling of symptomatic animals.

I. **Introduction** – Reason for the Study

The neighboring states of Colorado and Wyoming have recognized the existence of Chronic Wasting Disease in free ranging deer and elk since 1981 and in research herds as early as 1967. The increasingly prominent profile of this disease with hunters prompted the Utah Division of Wildlife Resources to propose a Chronic Wasting Disease Surveillance program in the fall of 1998. They sought the cooperative efforts of the veterinarians from the Animal Industry Division of the Utah Department of Agriculture and Food (UDAF). The

surveillance program included both Targeted Surveillance of symptomatic animals and Hunter Harvested Surveillance.

Sporadic Creutzfeldt – Jakob Disease was diagnosed in a 29-year-old Utah man in 1998 as the initial CWD study was nearing completion. An epidemiological interview conducted by the Centers for Disease Control (CDC) and Utah Department of Health (UDOH), revealed that the Utah patient was an active lifelong hunter. The history of consumption of wild game was identified as a common risk factor in similar interviews with two other people under the age of thirty who suffered from this disease that same year; one from Oklahoma, and one from Florida. CDC requested the cooperation of USDA, APHIS, Veterinary Services (VS) and UDAF and other state agencies in conducting a study of the possible incidence of CWD in the areas where these three victims had hunted and obtained wild game. UDAF and DWR, cooperatively with USDA, APHIS, VS, agreed to extend their study for one more year.

II. **Background** – Natural History of Chronic Wasting Disease

Chronic Wasting Disease was first recognized clinically in a cervid research facility in Colorado as early as 1967. It was identified as a spongiform encephalopathy in 1977. The disease was found in deer in a research facility near Wheatland Wyoming in 1978. In 1981, the disease was diagnosed in free ranging elk in north central Colorado. The partially protease-resistant form of the prion protein was detected in the brains of CWD affected deer and elk in 1991.[1] The emerging outbreak of Bovine Spongiform Encephalopathy (BSE) in the UK and its link to new variant Creutzfeldt – Jakob Disease (vCJD) in young adult humans directed attention to other spongiform encephalopathies, including CWD. There has been no demonstrated association between CWD of deer and elk, and CJD of humans, despite over 30 years of working with this disease in the endemic area. The World Health Organization (WHO) summarized its findings with the following statement issued in December 1999: "There is currently no evidence that Chronic Wasting Disease in Cervidae is transmitted to humans..."[2]

III. Methods.

Hunter Harvest Surveillance. In **1998**, a total of 154 samples were collected by UDAF veterinarians and DWR biologists during the hunter harvest survey. Samples were collected from 20 of the 29 counties in the state in 1998. Samples were collected from 80 elk and 74 deer. The samples were screened histopathologically (H&E) by the USU Veterinary Diagnostic Laboratory in Logan. Six of the 154 samples were referred to National Veterinary Services Laboratory (NVSL) in Ames, IA for immunohistochemistry evaluation following the screening, all were negative.

Sampling criteria for the 1998 study required that the animals be dead no longer than 12 hours prior to collection, and that they be at least 2 years of age. Samples were collected at big game checking stations, game-processing plants and by field personnel and were submitted in formalin. The samples were collected through the foramen magnum with the aid of a chemical spatula, which had been modified to serve as a brain spoon, or by removing the cranium.

In **1999**, 654 samples were collected from hunter-harvested deer and elk. Samples were submitted from 222 elk and 385 deer. Samples were collected from 26 of the 29 counties in the state. The financial participation of USDA allowed 600 samples to be selected and submitted to NVSL for immunohistochemical evaluation without charge. (A total of 607 samples were, in fact, submitted.) UDAF and USDA veterinarians, as well as wildlife biologists from DWR and personnel from the Utah Veterinary Diagnostic Lab collected the samples from the obex area of the medulla oblongata. Tissues were sectioned by the Utah Veterinary Diagnostic Laboratory and submitted on pre-numbered slides to NVSL, where they were examined using immuno-histochemistry techniques.

The use of immunohistchemistry testing allowed for the inclusion in the sample of tissues collected up to 72 hours postmortem. Data collected included species, sex, age, hunt unit, county, date of kill, hunter's name, and telephone number. Hunter's were asked to enter the data on a plastic tag, which was attached to the head. The heads were kept under refrigeration by the processing plants until collected by survey representatives, or, alternatively, samples were collected on the spot at game checking stations set up by DWR. Hunters were asked to donate the heads of deer and elk harvested by them. Participation was voluntary, and some of the hunters with trophy size animals declined to participate.

Targeted Surveillance. The second aspect of the surveillance program involved targeted surveillance of diseased animals that may or may not exhibit central nervous system (CNS) symptoms. Several such samples have been submitted as part of this program. The Assistant State Veterinarian presented three different staff awareness training sessions for DWR personnel. Selected wildlife biologists and private veterinary practitioners have also been trained in collection methods and this should improve the quality of future samples. This program will require surveillance over an extended time period in order to collect a significant database.

IV. Results.

Hunter Harvest Surveillance. Sample distribution over the 15-month period covering both studies was statewide with the exception of Salt Lake County, which is metropolitan in nature and presents limited hunting opportunity, and Piute County. The hunting areas frequented by the young Utah CJD victim were targeted for a minimum of 60 samples from each area and that goal was met. The partially protease resistant prion-protein (pr-P) associated with CWD was not detected in any of the samples in the Utah study. The quality of samples submitted was reported to be excellent by laboratory personnel. Hunter response to the collection of samples was gratifying. Map # 1 depicts overall statewide sample coverage for both studies[3](See Appendix).

In the 1999 study, 68% of the samples were from deer and 31% from Elk. Distribution by species and location of samples collected in 1999 is tabulated in Table # 1[4] (See Appendix). Approximately 50% of the samples came from animals 2 ½ years of age and the remaining 50% came from animals 3 ½ years of age and older. Age distribution is indicated in Table # 2 (See Appendix).

Male deer comprised 75% of the deer sampled and 50% of the total sample. Female deer accounted for 19% of the deer sampled and 13% of the total sample. Male elk represented 20% of the elk sampled and 7% of the total sample. Female elk comprised 61% of the elk sampled and 19% of the total sample. Sex distribution by species is shown in Table # 3 (See Appendix). The large number of male deer in the study, compared to male elk, reflects the relative trophy value of a branched antler elk compared to that of a young deer, and the reluctance of hunters to allow sampling of animals perceived as trophies.

Testing 302 samples in an estimated statewide elk population of 60,000 provides a greater than 90% probability that the disease would be detected at an incidence level of 1% in the population. Likewise, a sample size of 452 animals in an estimated statewide population of 340,000 deer provides a greater than 95% probability that the disease would be detected in a population where the disease prevalence is 1% or greater. Finally, a total sample size of 761 animals sampled in a combined deer and elk population of 400,000 animals[5] provides a greater than 99% assurance of detecting the disease in a population where the incidence of the disease is 1% or greater.[6]

Targeted Surveillance. Ten samples from animals exhibiting various symptoms have been presented in the last 2 years and suitable tissues for histopathology were obtained from 6 of those. All were negative. Samples were not acceptable for examination from the other 4 animals due to various reasons such as gunshots to the head, decomposition associated with delays in sample collection, etc.

V. Limitations.

In Utah, the sampling goal of 60 samples taken from each of the hunting areas frequented by the CJD patient was met. The reduced number of samples from other areas of the state was in deference to this objective. Age distribution of the animals sampled in Utah was thought to be representative of the harvest demographics of the areas sampled, with the minor exception that some of the hunters who harvested older trophy animals declined to participate in the study out of fear of ruining the trophy. Those who elected not to participate represented only an estimated 1-2% of the total sampling. Sex demographics was influenced by perceived trophy value, especially with regards to male elk.

There was minimal time lag between the consumption of game by the Utah CJD patient and the surveillance study, since the patient was an active hunter up until the time of his diagnosis. This was not felt to be a limitation in the Utah study.

Only 607 samples were submitted in the 1999 study even though 652 samples were collected. The limitation here was the lack of funding for testing the remaining samples.

VI. Conclusions.

The existence of protease resistant prion-protein associated with Chronic Wasting Disease was not detected in the deer and elk sampled in the Utah study. It is believed that targeted surveillance of symptomatic animals is the preferred method of surveillance for this disease and UDAF and DWR have embarked on this effort. Future efforts will be directed towards training of frontline personnel regarding awareness and timely sampling as essential elements of our targeted surveillance program.

[1] Time line from Linda Detweiler, USDA, APHIS
[2] www.who.int

[3] GIS Map by Anne M. Johnson, UDAF
[4] Tabulated by Bruce King, UDAF
[5] Population estimate by Steve Flinders, DWR
[6] Statistical analysis by Wyatt Frampton, UDAF, using Epi-Info software

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APPENDIX

TABLE #1

1998-99 CWD STUDY – SAMPLES COLLECTED
DISTRIBUTION BY SPECIES AND COUNTY

DISTRICT	COUNTY	ELK	DEER	TOTAL	
NORTHERN	BOXELDER	2	8	10	
	CACHE	8	2	10	
	DAVIS	0	1	1	
	MORGAN	4	66	70	
	RICH	3	7	10	
	SALT LAKE	0	0	0	
	TOOELE	1	3	4	
	WEBER	3	12	15	
		21	99	120	TOTAL
CENTRAL	JUAB	4	29	33	
	MILLARD	0	7	7	
	SANPETE	21	36	57	
	SEVIER	49	33	82	
	UTAH	29	28	57	
		103	133	236	TOTAL
EASTERN	CARBON	8	9	17	
	DAGGETT	2	1	3	
	DUCHESNE	11	15	26	
	EMERY	2	7	9	
	GRAND	11	3	14	
	SANJUAN	6	11	17	
	SUMMIT	47	75	122	
	UINTAH	25	17	42	
	WASATCH	28	57	85	
		140	195	335	TOTAL
SOUTHERN	BEAVER	2	2	4	
	GARFIELD	13	2	15	
	IRON	6	20	26	
	KANE	1	3	4	
	PIUTE	0	0	0	
	WASHINGTON	0	5	5	
	WAYNE	16	0	16	
		38	32	70	TOTAL
		302	459	761	GRAND TOTAL

TABLE #2

AGE DISTRIBUTION OF THOSE ANIMALS WHOSE AGE WAS REPORTED

AGE (years)	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	TOTAL
NUMBER REPORTED	174	89	51	14	6	7	5	0	1	347
PERCENT OF TOTAL	50%	26%	15%	4%	2%	2%	1%			100%

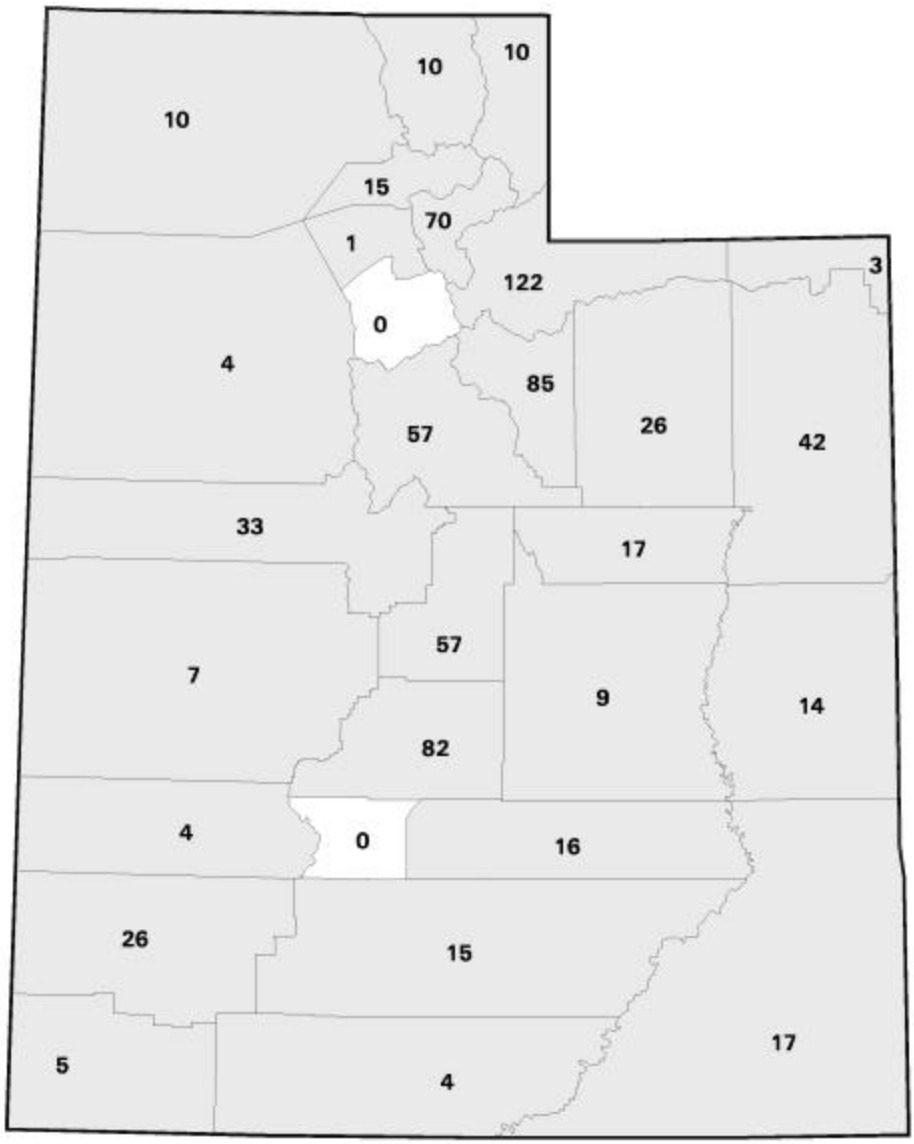
TABLE # 3

1999 DISTRIBUTION BY SPECIES AND SEX

	MALE	FEMALE	?	
DEER	302	78	30	#
	50%	13%	5%	%
ELK	38	116	37	#
	6%	19%	6%	%
?			6	#
			1%	%

MAP #1

Distribution of CWD Surveillance Sampling by County



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